XXIX. *Some Account of an undescribed Fossil Fruit. By* Robert Brown, *Esq., D.C.L., F.R.S., V.P.L.S.*

Read June 15th, 1847.

THE following imperfect account of a singularly beautiful and instructive silicified Fossil has been hastily drawn up, to supply in some measure the possible want of any other memoir for the present Meeting.

The remarks which I am enabled to make, from detached memoranda, on so short a notice, will principally serve to explain the accompanying drawings, which I have carefully superintended, and which exhibit a very satisfactory microscopic analysis of its structure, and do great credit to the artistical talent of Mr. George Sowerby, jun.

The only specimen of this Fossil known to exist, was brought to London in 1843 by M. Roussell, an intelligent dealer in objects of natural history. His account of it was, that it had been in the possession of Baron Roget, an amateur collector in Paris, for about thirty years; that after his death it was brought to public sale with the rest of his collection, but no offer being made nearly equal to the sum he paid for it, which was 600 francs, it was bought in. It was purchased here from M. Roussell jointly by the British Museum, the Marquis of Northampton and myself, for nearly 30*l*. It seems to have entirely escaped the notice of the naturalists of Paris. Nothing else is known of its history, but from its obvious analogy in structure and in its mineral condition with *Lepidostrobus*, it may be conjectured to belong to the same geological formation.

The specimen is evidently the upper half of a Strobilus very gradually tapering towards the top. As brought to England it was not quite two inches in length; but a transverse slice, probably of no great thickness, had been removed from it in Paris: the transverse diameter of the lower slices somewhat exceeded the length of the specimen; its surface, which was evi-

dently waterworn, is marked with closely-approximated hexagonal areæ, of which the four lateral sides are nearly twice the length of the upper and lower; these hexagons, which are the waterworn terminations of the bracteæ of the Strobilus, becoming gradually smaller and less distinct towards the top.

A transverse section of the Strobilus exhibits a central axis, from which radii directly proceed, constantly thirteen in number, resembling, when perfect, the spokes of a wheel, but several of them being always more or less incomplete. These radii alternate with an equal number of oblong bodies, also radiating, of a lighter colour, and which are not directly connected with the axis: beyond these twenty-six radiating bodies a double series of somewhat rhomboidal areolæ exist. These appearances not readily indicating the actual structure in the transverse, are satisfactorily explained by the vertical section.

From the vertical section it appears that the Strobilus is formed of a central axis of small diameter compared with the parts proceeding from it, which consist,—

1. Of bracteæ densely approximated and much imbricated: the lower half of each of these stands at right angles to the axis, while the imbricating portion, of about equal length with the lower, and forming an obtuse angle with it, is gradually thickened upwards: these form the spokes and external rhomboidal areæ of the transverse section.

2. Of an equal number of oblong bodies of a lighter colour and more transparent, each of which is adnate and connected by cellular tissue with the upper surface of the supporting bractea. These bodies are sections of *Sporangia* filled with innumerable microscopic *sporules*, originally connected in threes (very rarely in fours), but ultimately separating, as shown in Tab. XXIV. fig. G.

From this triple composition or union of sporules, which differs from the constant quadruple union in tribes of existing plants, namely *Ophioglosseæ* and *Lycopodiaceæ*, which, from other points of structure, may be supposed most nearly related to the fossil, I have called it *Triplosporite*, a name which expresses its fossil state, the class or primary division to which it belongs, and its supposed peculiarity of structure.

The structure of the *axis*, which is well preserved in the specimen, di-

stinctly shows, in the arrangement of its vascular bundles, a preparation for the supply of an equal number of bracteæ. These vascular fasciculi are nearly equidistant in a tissue of moderately elongated cells.

The vessels are exclusively scalariform, very closely resembling those of the recent Ferns and *Lycopodiaceæ*; and among fossils, those of *Psarolites*, *Lepidodendron*, and its supposed fruit, *Lepidostrobus*, as well as several other fossil genera; namely, *Sigillaria*, *Stigmaria*, *Ulodendron*, *Halonia*? and *Diploxylon*.

The coat of the sporangium appears to be double; the outer layer being densely cellular and opake, the inner less dense, of a lighter colour, and formed of cells but slightly elongated.

On the lower or adnate side of the sporangium this inner layer seems to be continued, in some cases at least, in irregular processes to a considerable depth. I cannot, however, find that the sporules are actually formed in this tissue, but in another of somewhat different appearance and form, of which I have only been able to see the torn remains.

The minute granular bodies which accompany the sporules in the drawing Tab. XXIV. fig. G. are probably particles of the mother cells, and are neither uniform in size nor outline.

The whole specimen has suffered considerable decay or loss of substance, which is most obvious in the sporangia from their greater transparency, but equally exists in the opake bracteæ, in which radiating crystallization occupies the space of the removed cellular substance.

I cannot at present enter fully into the question of the affinities of *Triplosporite*. I may remark, however, that in its scalariform vessels it agrees with all the fossil genera supposed to be Acotyledonous. In the structure of its sporangia and sporules it approaches most nearly, among recent tribes, to *Lycopodiaceæ* and *Ophioglosseæ*; and among fossils, no doubt, to *Lepidostrobus*, and consequently to *Lepidodendron*.

The stem structure of *Lepidodendron*, known to me only in one species, *Lepidodendron Harcourtii*, offers no objection to this view, the vascular arrangement of the axis of its stem bearing a considerable resemblance to that of *Triplosporite*. To the argument derived from an agreement in structure between axis of stem and of strobilus I attach considerable importance, an equal agreement existing both in recent and fossil *Coniferæ*.

In conclusion I have to state, that very recently (since the drawings were completed, and as well as the specimens seen by such of my friends as were interested in fossil botany) Dr. Joseph Hooker has detected in the sporangia of a species referred to *Lepidostrobus* sporules, and those also united in threes. There are still, however, characters which appear to me sufficient to distinguish that genus from the fossil here described.

To the brief account here given of *Triplosporite* it is necessary to add a few remarks on some nearly-related fossils, chiefly *Lepidostrobi*, whose structure is now more completely known than it was when that account was submitted to the Society.

On the affinities of *Lepidostrobus* to existing structures, respecting which various opinions have been held, it is unnecessary here to advert to any other than that of M. Brongniart, which is now very generally adopted, namely, that *Lepidostrobus* is the fructification of *Lepidodendron*, and that the existing family most nearly related to *Lepidodendron* is *Lycopodiaceæ*. The same view is in great part adopted in my paper. But I hesitated in absolutely referring *Triplosporite* to *Lepidostrobus*, from the very imperfect knowledge then possessed of the structure of that genus. The specimens of *Lepidostrobus* examined by M. Brongniart were so incomplete, that they suggested to him an erroneous view of the relation of the supposed sporangium to its supporting bractea, and of the contents of the sporangium itself they afforded him no information whatever.

In concluding my account of *Triplosporite*, I noticed the then very recent discovery of spores in an admitted species of *Lepidostrobus* by Dr. Joseph Hooker, who, aware of the interest I took in everything relating to *Triplosporite*, the sections and drawings of which he had seen, communicated to me a section of the specimen in which spores had been observed, but which in other respects was so much altered by decomposition, that it afforded no satisfactory evidence of the mutual relation of the parts of the strobilus. The appearances however were such, that I hazarded the opinion of its being generically different from *Triplosporite*, an opinion strengthened by M. Brongniart's account of the origin of the sporangium.

Since the abstract of my paper was printed in the Proceedings of the Society, the second volume of the Memoirs of the Geological Survey of Great Britain has appeared, which contains an article entitled "Remarks on the Structure and Affinities of some *Lepidostrobi*." The principal object of Dr. Hooker, the author of this valuable essay, is from a careful examination of a number of specimens, all more or less incomplete, or in various degrees of decomposition and consequent displacement or absolute abstraction of parts, to ascertain the complete structure or common type of the genus *Lepidostrobus*; but the type so deduced is in every essential point manifestly exhibited, and in a much more satisfactory manner, by the single specimen of *Triplosporite*. This does not lessen the value of Dr. Hooker's discovery and investigation, but it gives rise to the question whether *Triplosporite*, which he has not at all referred to, and therefore probably considered as not belonging to *Lepidostrobus*, be really distinct from that genus; and although there are still several points of difference remaining, namely, the form of the strobilus in *Triplosporite*, confirmed by a second specimen presently to be noticed, and in *Lepidostrobus* the more limited insertion of sporangium, and the very remarkable difference in the form of the unripe spores, hardly reconcilable with a similar origin to that described in *Triplosporite*, I am upon the whole inclined to reduce my fossil to *Lepidostrobus* until we are, from still more complete specimens of that genus, better able to judge of the value of these differences. The name *Triplosporites* however is already adopted, and a correct generic character given, in the second edition of Professor Unger's 'Genera et Species Plantarum Fossilium,' p. 270, published in 1850, who at the date of his preface in 1849 was not aware of Dr. Hooker's essay on *Lepidostrobus*, the character of which he has adopted entirely from M. Brongniart's account.

In October 1849 M. Brongniart showed me a fossil so closely resembling the *Triplosporite*, both in form and size, that at first sight I concluded it was the lower half of the same strobilus. On examination however it proved to be of somewhat greater diameter. It was nearly in the same mineral state, except that the crystallizations consequent on loss of substance were rather less numerous; it differed also in the central part of the axis being still more complete; in the bracteæ being more distant and of a slightly

different form: but the spores in composition, form, and apparently in size were identical. This specimen had then very recently been received from the Strasburg Museum, but nothing was known of its origin or history.

May 5, 1851.

EXPLANATION OF THE PLATES OF TRIPLOSPORITE.

Tab. XXIII.

The figures A, B, C, and D are of the natural size.

Fig. A. A portion of the surface of the Strobilus, showing the hexagonal areolæ.

Figs. B. & C. Transverse sections, exhibiting different appearances of the bracteæ and sporangia.

Fig. D. A vertical section of fig. A.

The remaining figures, E, F, G and H, are all more or less magnified.

Fig. E. A transverse section of the axis.

Fig. F. A more highly magnified drawing of a portion of fig. E, to show the arrangement and proportion of the vascular and cellular tissues.

Fig. G. A horizontal section of a sporangium, made probably near its origin.

Fig. H. A portion of the outer wall of a sporangium or bractea.

Tab. XXIV.

All the figures magnified.

Fig. A. A vertical section of the axis, near, but not exactly in the centre, showing the ramifications of the central cord of the axis going to the circumference of the axis, and connected or supported by a loose cellular tissue at *a a*.

Fig. B. A small portion of the axis, from which proceeds a bractea cut vertically through its centre, showing its vascular cord, and bearing on its lower and horizontal half a vertical section of an adnate sporangium, of which the base is cellular, rising irregularly and without spores,—probably a rare occurrence.

Fig. C. A small portion of the axis, to show the scalariform vessels with the slightly elongated surrounding cells.

Fig. D. A similar portion, from the central axis of the bractea of fig. B.

Fig. E. A similar portion, from the line of union between the bractea and sporangium of fig. B.

Fig. F. A small portion of a sporangium, sufficiently magnified to show the arrangement and composition of sporules.

Fig. G. Several sporules, both in their compound and simple state, still more highly magnified, with the minute granular matter which usually accompanies them.